FEB 16 1943

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

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LIABILITIES	£
Capital paid up	15,158,621
Reserve Fund	12,910,609
Current, Deposit and other Accounts	760,094,994
Acceptances and Confirmed Credits	2,905,299
Engagements	10,299,882
ASSETS	
Coin, Notes and Balances with Bank of England	80,592,217
Balances with, and Cheques on other Banks	33,251,334
Money at Call and Short Notice ...	25,758,153
Bills Discounted (Treasury Bills £32,815,922)	34,696,054
Treasury Deposit Receipts ...	201,000,000
Investments	235,221,988
Advances and other Accounts ...	159,436,077
Liabilities of Customers for Acceptances, etc.	13,205,181
Bank Premises	8,844,446
Shares in Yorkshire Penny Bank Ltd.	937,500
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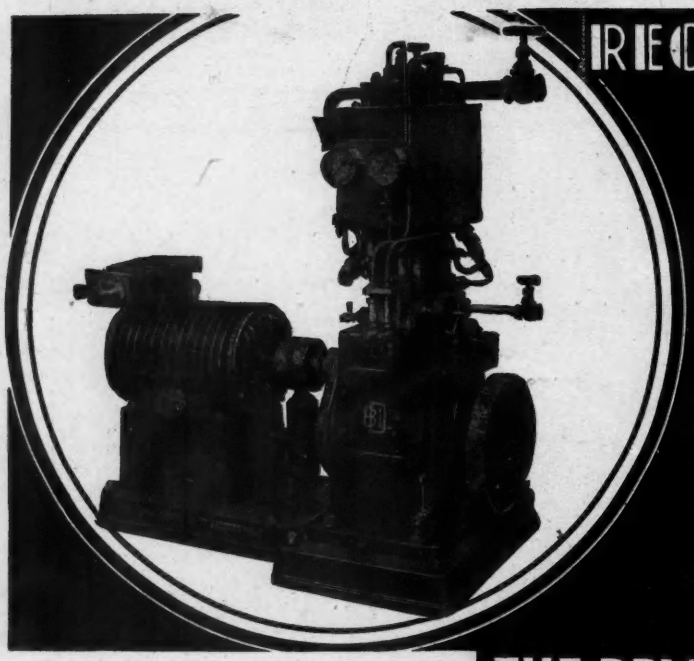

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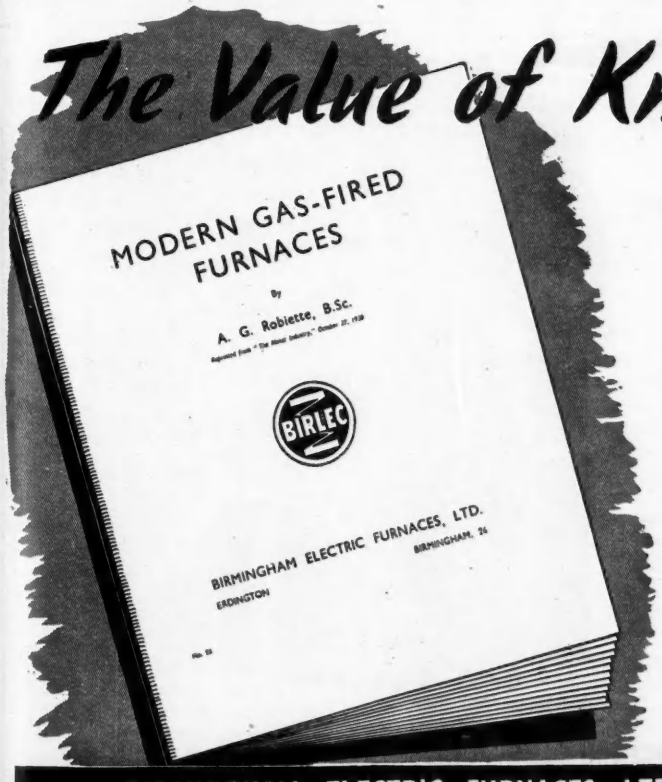

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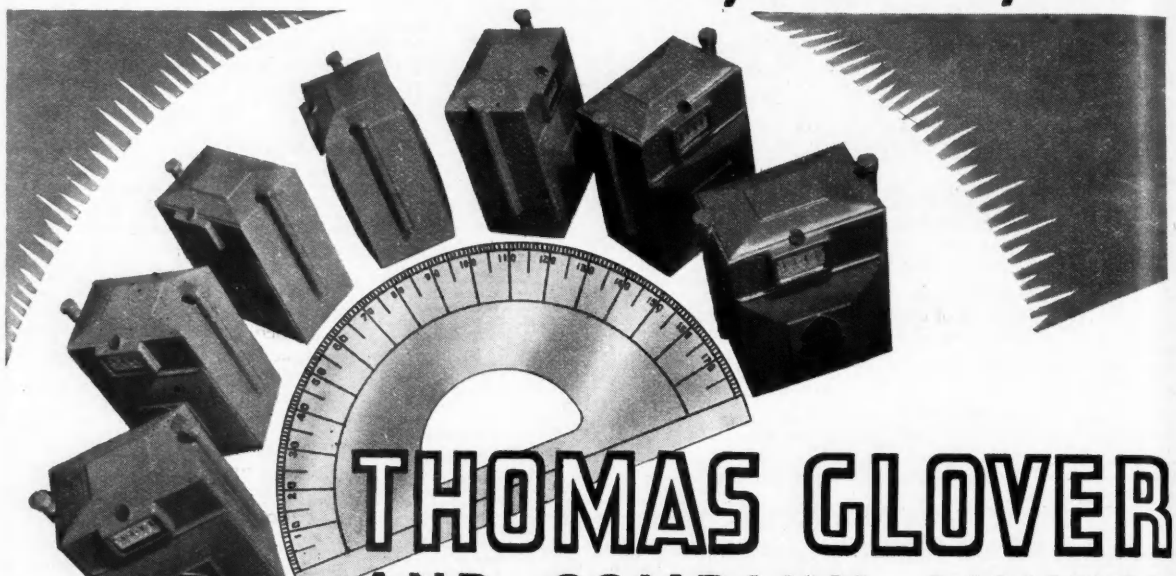

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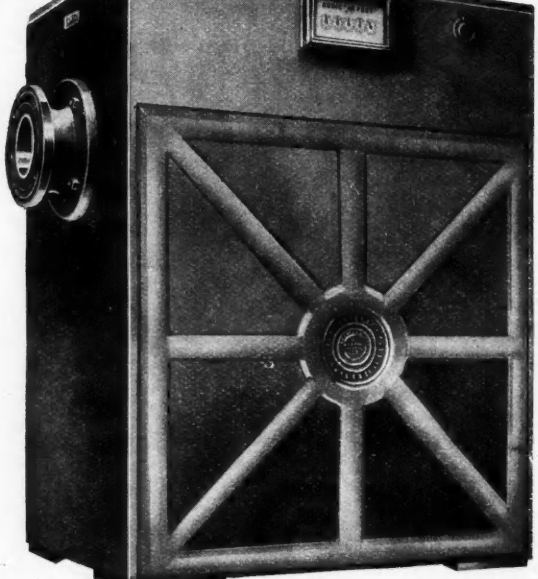

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P.8

GAS JOURNAL, JAN. 27, 1943

VOL. 241 95th YEAR No. 4158

EDITORIAL NOTES

PUBLIC RELATIONS

PERHAPS many of our readers may be wondering about the causes of Press comments in many national papers last week on the ideas of 3,000 housewives on the design of the home of the future given in reply to an enquiry conducted by the Women's Advisory Housing Council. They may have shared our wonder why so much stress was laid on a single finding—that housewives of the lower-income group would like an electric point in every room—and why gas was not mentioned at all in regard to the housewives' post-war dream. For our part, we have no objection whatever to an electric point in every post-war room, provided it can be afforded economically. Domestic lighting by electricity seems desirable enough and electric vacuums are useful and efficient; incidentally we have found the newest type of hand-operated carpet sweeper quite good. But what we would like to clear up is the background of this daily Press write-up on what was news value last October.

Reviewing the events of the year 1942 in our issue of Dec. 30 we referred to the Women's Advisory Housing Council, which is officially recognized as an advisory body by the Ministry of Health, and we mentioned that this Council had produced a report based on an analysis of the answers to 40,000 copies of a questionnaire on housing problems. We added that the Acting Secretary of the Women's Gas Council represented the W.G.C. on this body, which implied, of course, that gas was not being neglected in the national interest. Nor, in fact, do we think that gas was neglected *in the replies* to the questionnaire. The latter was a formidable document enough, asking no fewer than 193 questions—surely enough to scare large numbers of the housewives of the "lower income group" to whom it was addressed. The document enquired, among other matters, whether housewives would like a swimming pool or an open-air market, and whether they would like to have their dwellings either (*a*) in close proximity, or (*b*) far away from a public house; it ranged from the number of cess-pits in use to the moot question whether or not casement, sash, hopper, or swivel windows were most highly favoured. A report of the findings was prepared last October; there was a fireside chat to the Press about the whole matter then; but the report itself was not circulated till last week. Hence this short note; which makes us emphasize once again the great need for close and effective liaison between the Gas Industry and the Press—the cultivation of good public relations. Commenting on surveys of the type on Jan. 13 we said quite frankly that we found it difficult to know what value to put on them—and we gave our reasons, which we need not reiterate. Concerning the one we are discussing at the moment, the Women's Advisory Housing Council, in a finale to an analysis of its report, states the following desiderata, among others: Electricity to be made available at reasonable cost to all dwellings; and kitchens to be adequately fitted with refrigerators. We cannot and do not grumble at the daily Press for quoting these findings, but we have the feeling that "refrigerator" in the minds of the majority of housewives is associated with electricity, while in point of fact the most serviceable domestic refrigeration unit is gas-operated. The desire for a refrigerator seems to us to be pronounced, and we would ask the Gas Industry to bear this in mind and frame its policy in this direction accordingly.

Let us, however, consider one particular aspect of the report itself—that relating to preferences in the use of fuel for heating and cooking in the home—and let us record a few facts emerging from the questionnaire of the Women's Advisory Housing Council. Here are the dull statistics: First about what fuels people use for heating. In round figures (and surely decimal points on surveys like this are wholly comic—the Women's Advisory Housing Council, on 3,000 replies from a 40,000 questionnaire works to two decimal places), 32% use coal, gas, and electricity; 21% use coal and gas; 2% use gas only; *0.74 use electricity only* (our italics). Then as to the query: "Which do you like best: (*a*) coal, (*b*) gas, (*c*) electricity, (*d*) oil? Avoiding decimal places, 45% prefer coal, 22% prefer electricity only; 6% prefer gas only. These percentages, by the way, relate to the future. And, as we mentioned last week, funnily enough the capital cost of electrical power stations (Bulletin No. 11, Association for Planning and Regional Reconstruction) per unit of energy output "is nearly ten times that of gas and coke works."

We turn to cooking, and we find that 43% of the aforementioned housewives use gas only, and that 9% use electricity only. To the question which do you like best?, here are the actual results: Gas only, 43%; electricity only, 27%.

Facts such as presented by this survey show unmistakably that the Gas Industry has many useful figures to explain to the daily Press, and they reinforce the point on which we have insisted for years past—a really close and effective liaison.

CARBONIZATION BEFORE USE

IT is a good sign for the better and more rational use of coal in the future that engineers and others outside the circle of the carbonizing industries are talking with conviction of the need, in the national interest, of subjecting raw coal to treatment before it is consumed. A meeting of the Institution of Mechanical Engineers on Jan. 15 provided an excellent example of the kind. At this meeting a Paper on a national fuel and transport programme was given by Mr. W. Wakefield Adam, and speakers in the subsequent discussion were insistent that future plans should have as their basis the channelling of the different fuels available into the spheres to which they are best suited, and much of what was said centred on the question of the energy usefully applied translated back to the potential energy of the coal from which it was derived in the first instance. Specifically it was urged that to apply to purposes of general heating electricity generated from coal is neither more nor less than "criminal waste"—an expression used by more than one speaker in the discussion.

On the part of the Paper dealing with transport we are not qualified to comment, and we will confine our few remarks to the Author's ideas concerning the pre-treatment of coal, though we can hardly subscribe to all of them. For instance, the plea that there should be an immediate extension of oil production by the hydrogenation of coal at a time when every possible economy is needed in the use of coal does not appeal to us as sound when we consider the low efficiency of the process—the large amount of coal required for the processing of any given quantity of coal. In general, however, it is by no means a comforting thought that of the coal used about 85% is burned as raw coal, while only about 15% is processed. Factors other than the purely technical enter into the matter, of course, but Mr. Adam did a most useful service at the present juncture in focusing attention on the desirability of harnessing the potential value of coal and its derivatives instead of negligently throwing away these derivatives by persisting in the crude fashion of burning raw coal. It was all the more useful in that his imaginative Paper—presented, by the way, very ably indeed—was addressed to a body of engineers not concerned primarily with

coal conservation in its widest sense, or, more narrowly, with carbonization itself.

The Author asked his audience to consider the value of what is being wasted by burning raw coal. He suggested as a modest estimate that the derivatives of coal have three times the value of the raw product. His own view is that the correct figure is probably about five times. In 1938 the production of coal was 227 million tons; its value, he said, was £189,000,000, 85% of which works out at £161,000,000. If, he went on, we multiply this figure by 3, and deduct the raw value, wastage represents £322,000,000 per annum. If we multiply by 5 and deduct the raw value, annual waste amounts to £644,000,000. And he pictured the state of affairs which would have existed if, 25 years ago, a rational plan for the fuel and power industries had been put into action. Hence his welcome of the new Ministry of Fuel, the administration of which post-war, he hopes, will be comprised of full-time engineers and chemists having appropriate qualifications and experience, making possible "the restoration of prosperity in this country by providing a wide range of valuable products from coal, suitable for home consumption and for export on a large scale to many countries overseas."

We have mentioned that the discussion was concerned largely with the useful application of the potential heat in coal, and one of the speakers, Dr. S. L. Smith, recalled an investigation which he made jointly with Professor C. H. Lander in the year preceding the war. The investigation was into the relative efficiencies of central heating by coke and by electricity, and the results were recorded in the "JOURNAL" at the time. Dr. Smith remarked that, with coke at 40s. a ton, the cost of the useful therm actually delivered as heat into the building worked out, including labour and maintenance charges, at 3.44d. With electricity at ¼d. a unit, the corresponding cost of the useful therm worked out at 8.5d.—which exemplified his broad statement that electricity should not be used for heating purposes. Other speakers suggested that waste steam from electricity stations could to advantage be applied in a limited manner to district heating and to agriculture, but emphasized the limitations, calling attention to the fact that power loads and heating loads would not always synchronize. Interesting figures from the coal conservation point of view were also advanced concerning the equivalents in use of petrol and of alternative coal derivatives for motor transport. A gallon of petrol, it was argued, was equivalent to 14 lb. of coal used in the form of producer gas; 15–17 lb. in the form of low pressure or high pressure town gas; 16–23 lb. in the form of coke for steam wagons; 30 lb. in the form of electricity in the electrically propelled vehicle; and 30–45 lb. of coal in the form of oil produced by hydrogenation. Emphasis was also laid on the need for tackling the problem of coal conservation at the source by cleaning coal thoroughly at the pithead, employing the types of coal proved suitable for particular purposes, and making proper use of the invaluable information gained as a result of the work over the years of the Fuel Research Board's Coal Survey.

Both Paper and discussion were encouraging, and we were glad to learn that Mr. Adam intends to present his contribution shortly in Newcastle, again to an audience of mechanical engineers.

Director of Gas Research Board

In its third annual report ("JOURNAL" of Dec. 23 last) the Council of the Gas Research Board observed that it had very much in mind the desirability of extending its activities and mentioned that discussion had taken place with the Secretary of the Department of Scientific and Industrial Research regarding present and future position, policy, and scope of the Board. Owing to the outbreak of war a Director of the Board was not appointed, and since its formation Dr. W. T. K. Braunholtz, Secretary of The Institution of Gas Engineers, has been Acting-Director and Secretary. But, as will be seen from our advertisement columns to-day, applications are invited for the post of Director—a step of considerable importance, particularly in view of the plans for reconstruction in the Industries which are now under consideration for the post-war era. It will be noted that only such candidates will be considered as have qualifications and experience justifying a salary of not less than £2,000 per annum—some indication at any rate of the view taken of the importance of the post.

Personal

Mr. H. W. DEAN, Engineer and Manager of the Ellesmere Port Gas Department, is resigning his position on account of ill-health. He is to retire on superannuation early in April next. Mr. Dean received his early training with the Accrington and District Gas and Water Board, and has held appointments under the Birmingham and Todmorden Corporation Gas Departments. He was Gas Engineer and Manager at Padiham, and has held his present appointment at Ellesmere Port for about sixteen years.

* * *

As from Jan. 1 Mr. W. W. HAMMOND, Engineer and Manager of the Bognor and District Gas and Electricity Company, retired from that position. Mr. S. O. STEPHENSON is now officiating as Managing Director.

* * *

Councillor SYDNEY J. PERRY, Chairman of the Leicester Gas Committee, has accepted the Presidency of the British Commercial Gas Association. He succeeds Alderman Ernest Grimsley, J.P., who has retired owing to ill-health, after occupying the President's Chair since 1939.

* * *

Alderman Sir ALBERT BALL has been re-elected Chairman of the Nottingham Corporation Gas Committee for the 36th year.

Obituary

The death occurred on Jan. 22 of Lord HIRST of WITTON, Chairman of the General Electric Company. Lord Hirst, who was a Past-President and one of the founders of the Institute of Fuel, was President of the Federation of British Industries from 1936–38.

Letters to the Editor

Fuel Requirements of Carbonizing Plant

DEAR SIR,—The importance of Dr. Pexton's Paper on "Fuel Requirements of Carbonizing Plants" is my only excuse for drawing attention to two points in the Paper that I consider need correction:

(1) The gases NH_3 and H_2S are, in the first table on p. 20 of your issue of Jan. 6, accredited with a thermal value of 1.6 therms per ton of coal carbonized. The mode of entry of this 1.6 therms into the calculation of the thermal efficiency of gas production shows that this yield of therms effectively increases the efficiency of gas production, although the 1.6 therms is not credited to the gas yield. Now, so far as my knowledge goes, these gases never find use on account of their thermal content—their value arises entirely from their chemical rather than from their fuel characteristics. I think then that this 1.6 therms would, more appropriately, be lumped in with the "wastage," and then the efficiency of gas production would appear as 100/(1.10 + F), in place of the 100 (1.08 + F) given by Pexton and used in the sequel. The correction is admittedly small, of the order of 1% on the actual efficiency figures at present attained, but its incidence will be increasingly important as the efficiency of gas production is increased towards the limit.

(2) Although the formula employed for the calculation of the efficiency of gas production does not justify an accuracy of more than 1 part in 100, the calculated values of ^{E}G.P. are recorded as though they possessed an accuracy of 1 part in about 600. I suggest that the numbers at the foot of Table 1 on p. 23 require amendment to read 54%, 61½%, 64%, and 70%, in place of 54.2%, 61.6%, 64.1%, and 69.7%.

9, Beaufort Road,
Cheltenham.
Jan. 22, 1943.

Yours faithfully,
J. S. G. THOMAS.

DEAR SIR,—In his Paper Dr. Pexton illuminates the future in a masterly fashion. A glance back to the pioneer days of continuous verticals in 1911 may also be worth while.

Regarding convection losses from carbonizing units, in vertical retort units the tall exterior insulated vertical walls induce almospheric currents adjacent to the hot brickwork, which convect away valuable heat to waste, and inconvenience the eyes of those controlling the setting. To reduce this loss and inconvenience the horizontal platform bench bracings were made to contact the brickwork, by which means the currents of air were deflected from the brickwork to move upwardly some distance away and behind the attendant, so that convection losses were reduced and conditions improved for the staff.

As to the up-grading of coke breeze, in those early days it was

reasoned that from Yorkshire coals the breeze content of the coke as it left the retorts would be only some 6%. Therefore if the coke could be loaded during the daytime direct from retorts to consumers' carts, attrition of coke would be obviated and 94% of the coke substance would be in consumers' carts as prime coke. (To-day the attrition of handling, grading, and storing coke is probably 15% to 20%, so that only 80% to 85% of the coke substance reaches the consumers as prime coke.) To accomplish this with safety it was essential to cool the coke before discharge to a greater extent than otherwise would be necessary. This was achieved by regenerating the heat of the coke (to the advantage of fuel economy) by circulating in large cross-section rectangular iron tubes, forming the lower ends of the retorts, (1) secondary air, (2) primary air, (3) water-vapour for the producers. It was also necessary to build the plant sufficiently high to permit consumers' carts to draw beneath and so to group the retorts that four retorts could discharge into and properly load the carts. Thus was achieved the partial up-grading of the coke breeze by finding alternative utilization, as between day and night periods.

43, Uxbridge Road,
Hampton, Middx.
Jan. 17, 1943.

Yours faithfully,
H. J. TOOGOOD.

Mr. Therm Post-War

DEAR SIR,—As one who was present at the birth of Mr. Therm some eight or nine years ago I was interested in the letter from your correspondent "Token." He suggests that, when war is over, the Industry will need a new, or altered, symbol which will in some way express the idea of service, and mentions as an example Mr. Service-Therm.

This is, of course, a matter for decision by the British Commercial Gas Association, but as an outsider I would like to comment briefly. I speak with close knowledge of Mr. Therm. From his birth he and I have been much thrown together.

The first essential of a successful symbol is that it should succeed. Mr. Therm's success was of the order which, in a history of advertising, would claim a chapter to itself. True, he had a fine start. Adopted by a great Industry he never lacked strong financial backing. But, although Mr. Therm, like any other successful advertising notion, could have done little without a heavy appropriation behind him, he had, and has, some intrinsic virtues as a symbol which are impressive and are still too valuable to the Industry to be lightly regarded.

What are these virtues which differentiate Mr. Therm from so many advertising symbols? He is, first, entirely suitable in character. He is mobile, not static. Only those, perhaps, concerned with producing advertising material can really appreciate the enormous advantage of this. He is friendly and engaging and not, like many symbols, snooty and high hat. He talks (a rare gift with symbols) and people listen (rarer still). He is adaptable. He appears with equal ease and propriety at rather serious openings of new showrooms or at chatty Home Service talks. In fact Mr. Therm has been made into a public personality. All of these are solid sales and goodwill promoting merits.

Where he has proved capable of so much, I have no doubt that if, after the war, the note to be sounded by the Gas Industry is Service, Mr. Therm, in the proper hands, will comfortably and effectively get this job off his two-dimensional chest—and more.

Yours faithfully,
CHARLES F. TOMKINSON.

Jan. 19, 1943.

Government Offices to Use Coke

At the suggestion of the Minister of Fuel and Power, instructions have been sent by the Ministry of Works and Planning to the occupants of some 10,000 Government premises throughout the country telling them to mix coke with the coal on office fires. This step has been taken because coke is more readily available than house coal in many parts of the country and it is important that everyone, including ordinary domestic consumers, who can do so should use it to eke out coal on open fires.

The instruction issued by the Ministry of Works and Planning points out that the most suitable type for the purpose is broken coke 1 in. by 2 in., but that other sizes may be used.

All sizes of coke (together with certain other fuels) are subject to less severe restrictions than house coal for the three months January to March.

For coke not exceeding 1 in. in size, anthracite and Welsh dry steam coal not exceeding 1¼ in., and all types of manufactured fuel, total supplies may not exceed 10 cwt. per month, and no consumer may acquire any supplies while his stock of these fuels exceeds 10 cwt. For coke exceeding 1 in. in size, and anthracite and Welsh dry steam coal exceeding 1¼ in., total supplies may not exceed one ton per month, and no consumer may acquire supplies while his stock of these fuels exceeds one ton.

The amounts mentioned of the above fuels are additional to those allowed for other kinds of coal.

Tar Base Black Paint

The British Standards Institution has just published a War Emergency British Standard for Black Paint (Tar Base) for use on Iron and Steel. The purpose of this wartime Specification is to provide definitions of the properties and general composition of tar-base black paints for the protection of steel and iron work.

The products which are described can be prepared simply from materials which are at present in comparatively easy supply, and give satisfactory protection for a reasonable period when correctly applied. It cannot be too strongly emphasized that the protective properties of these paints, as with others, are fundamentally dependent on the care taken in application, and special attention is therefore drawn to this point in Appendix G of the specification. Attention is also called to Clause 1, regarding paint for warm application.

Copies of this War Emergency British Standard, B.S. 1070/42, may be obtained from the British Standards Institution, 28, Victoria Street, S.W. 1; price 1s. net (post free).

Glasshouse Heating

The Minister of Fuel and Power has given a Direction under the Control of Fuel (No. 3) Order entitled General Direction (Glasshouse Heating) No. 1. This Direction, which came into force on Jan. 15, prohibits the use or consumption of any fuel for heating a glasshouse or any part thereof except under permit in writing from the Minister or a Regional Fuel Controller. Glasshouses which are used wholly for the production of tomatoes, lettuce, mustard, and cress or for the raising of young vegetables do not come within the Direction.

In addition, the Direction does not apply to a glasshouse used for producing food crops for sale if it is situated on a holding of agricultural land exceeding ¼ acre and the occupier complies with the provision of Article 4 of the Horticultural (Cropping) Amendment and Consolidation Order, 1942; or the corresponding Scottish Order, which applies to any glasshouse on a holding of agricultural land irrespective of size.

Where hot-water pipes forming part of a general central heating system of a house pass through a glasshouse and cannot be adjusted so as to prevent the heating of the glasshouse, such heating is not prohibited. But when a glasshouse is fitted with radiators or other heating appliances which can be separately controlled the restrictions contained in the Direction will apply.

For the purpose of the Direction fuel means coal, coke, paraffin, gas, electricity, liquid fuel, and wood fuel—except such wood fuel as has not been acquired from another person by the occupier of the glasshouse for use as fuel. Glasshouse owners may, therefore, use waste wood from their own trees or garden rubbish for heating their glasshouses for growing any plants they wish.

The Next Meeting of the Industrial Gas Centres Committee will be held at Gas Industry House, on Feb. 11, at 9.30 a.m.

A Meeting of the Eastern District of the Southern Association of Gas Engineers and Managers will be held on Feb. 12 at Gas Industry House at 2.30 p.m., when Mr. F. M. Birks, Chief Engineer of the Gas Light and Coke Company, will read a Paper entitled "The Work of the Gas-Works Safety Rules Committee."

It is Believed that Sergt. W. P. Matthews, of the Torquay and Paignton Gas Company, is the first Home Guard to shoot down a German aeroplane—a F.W. 190.

We Have Received a copy of "Rates Levied in Various Towns, 1942–43." This is the 58th annual statement and is compiled by Mr. W. Allison Davies, Borough Treasurer of Preston, and includes the charges for gas and water supplies. Merthyr Tydfil heads the list with a rate of 30s. in the £, while Hove is lowest with 7s. 8d.

Notwithstanding the difficulties of war-time catering, the Cambridge University and Town Gas Light Company's Recreation Club entertained about 80 children at the Annual Party on Jan. 9.

At the London Works of Sternol, Ltd., the lubricating oil firm, just before the Christmas holiday, the Managing Director presented long service certificates to men who had been in the Company's employ for 20 years and upwards. Each recipient, in addition to a framed certificate signed by the Chairman and the Managing Director, received an extra monetary gift and a grant of a permanent addition to his standard wages. The Chief Foreman, on behalf of the men, expressed appreciation of the Company's action and thanked the Managing Director for personally attending the ceremony, at the same time congratulating him on the fact of his having completed a 50-years' connexion with the Company.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

DISCUSSION ON DR. PEXTON'S PAPER

[The Paper, given to the London and Southern District Junior Gas Association, was published in the "JOURNAL" of Jan. 6, 13 and 20.]

The **President** (Mr. G. Dougill) indicated that Dr. Pexton had favoured the Association with an outstanding contribution.

Mr. **T. C. Finlayson** (the Woodall-Duckham Companies): Dr. Pexton is regarded by plant designers as the "chief test pilot" of modern carbonizing installations, and his expert and incisive analyses of performance have proved of great value. The main theme of Dr. Pexton's Paper is the importance of fuel requirements of carbonizing plants, and in passing it is a surprising fact to find how many installations make no provision for weighing producer fuel. He showed that if hot producer gas could be used an efficiency of 87.4% could be attained compared with an efficiency of 76.6% for clean cold producer gas. This fact, coupled with the lower capital cost of non-recuperative settings, is the main cause why the use of hot uncleaned producer gas is generally preferred on gas-works carbonizing plant, the saving in fuel and capital charges when using hot gas outweighing the saving in maintenance cost by the use of clean cold gas.

Probably the most striking figures in the Paper are given in Tables VII and VIII, which show that whereas the fully regenerative coke oven gives a fuel consumption of 10.8% dry coke, the modern continuous vertical retort with no allowance for heat recovery from the waste gases gives a fuel consumption of 11.1% dry coke.

Seeing that steam is required on all gas-works, it would appear that the true comparison should be between the fully regenerative coke oven and the continuous vertical retort with waste heat recovery —that is to say, after crediting the latter with the surplus steam which can be produced from the waste gases leaving the setting. Taking Dr. Pexton's figures it can be calculated that the net fuel consumption of the continuous vertical retort is only 7.6% instead of 11.1% as stated in his Paper, which compares even more favourably with the fully regenerative coke oven.

A word of warning is necessary in using Dr. Pexton's data for different conditions of gas manufacture. The fuel consumption of 11% for continuous vertical retorts is undoubtedly assisted by the high calorific value of gas being made. Although the decomposition of coal may be thermally neutral, it is apparent that it is an easier thermal job to make a therm of coal gas than it is to make a therm of water gas. It would be very valuable if Dr. Pexton in his capacity of "chief test pilot" would examine the fuel consumption and heat balance of one of his installations at a calorific value of 50 B.Th.U. below his present series of tests and possibly on a coal other than Durham.

There has been plenty of opportunity of checking the correctness of Dr. Pexton's remarks on the heat loss from the surface of settings. Competitive design has led to a tendency to reduce the size of settings, and it has been found that the compactness of the modern setting has contributed materially to fuel economy. For example, to double the major axis of a continuous vertical retort decreases the exposed surface by about 33% per ton of coal carbonized. The compactness of modern settings, although it may have led to certain undesirable features in design, has undoubtedly contributed to the low fuel consumption now attained.

With reference to the remarks on heat insulation, as Dr. Pexton fully realizes, provision of heat insulation is not a simple matter. It is necessary to maintain a balance between capital cost, fuel economy, and operating convenience. To give an example, heat loss may be found to be excessive from the waste gas neck from a setting, but the provision of a thicker lining may involve widening the centres between adjacent retorts. This in turn may lead to a loss of more heat from the larger exposed surface of the setting, apart from increasing the capital cost of the plant. Again, heat loss may be avoided by stopper bricks at points where access is required to operating dampers, but this in turn may complicate ease of operation.

Dealing with the question of the cooling of coke, it is to be noted that the temperature of the coke leaving the retort varies with the calorific value of the gas being made, and cooling the coke by means of primary or secondary air only applies in cases where high calorific value gas is being made.

Mr. **W. S. Gaskill** (West's Gas Improvement Company) stressed the importance of collaboration between plant operators and designers. He was glad to see the ill effects of using too large a proportion of secondary air so clearly expressed. He would like to see data for waste heat steam production added to the comparative data given for various carbonizing systems. As regards combustible matter in producer ashes he wondered how many works were attaining standards equal to the data given in the Paper. Further, how did a steam-blown step grate producer compare with the example quoted for a step-grate producer with water fed to the bars?

Mr. **J. M. Webber** (Croydon Gas Company): Every year we use some 20,000 tons of coke alone at Croydon for heating retorts, and so we have a keen appreciation of the extreme importance of the study of Dr. Pexton's subject. In some ways it seems a pity that coke from retorts slips so unobtrusively into the producers. A more difficult and conspicuous route might serve to focus more attention on the very large quantities of fuel involved. Take, for example, a retort house carbonizing 500 tons of coal per diem with a fuel consumption of 13.5% (dry). On a rough calculation the coke alone used for fuel in such a house, making, say, 6¾ million cu.ft. of gas per day, would suffice for the manufacture of 3½ million cu.ft. of carburetted water gas per day in an external plant, and if used for this purpose, the coke would receive very much more attention.

Dr. Pexton's calculations and heat balances will be most valuable to those of us who may wish to work out results on our own plants, and will save us an enormous amount of wasted effort in search of methods of approach. His analysis of the mechanism of cooling coal gas by means of liquor sprays in the gas offtakes is most interesting, and this information, together with the figures for the total heat of coal gas saturated with water vapour, are going to be most useful to us in an examination of condenser capacity and cooling water requirements.

The comparison of the potential efficiencies of recuperators and regenerators is very enlightening, as also are the diagrams showing the heat outgoings in various types of plant. If Lord Kelvin was right when he said that the first requirement in the search of knowledge was the ability to measure, then Dr. Pexton's Paper is indeed going to help us.

Dr. **A. E. Haffner** (Gas Light & Coke Company): A criticism of the use of central mechanical producers is implied in the Paper because of the loss of sensible heat in the gas after it has been cold cleaned. The loss could be obviated by—

1. Steam raising in the generator boiler, and in recent designs of producers the generator boiler consists wholly or partially of water tubes around which the hot producer gas flows. Steam is thereby generated at a usefully high pressure.
2. Heat exchange between hot coke and cold clean producer gas. This would be specially applicable to continuous vertical retorts where Dr. Pexton is searching for an extra cooling medium. A flue system similar to secondary air pre-heating flues would be suitable.
3. Heat exchange between hot dirty producer gas and cold clean producer gas. This would be suitably carried out in a metal recuperator.

Notable developments have occurred in metal recuperators which have the advantages of gas tightness, high conductivity, and therefore small size, which in turn makes it possible to detach them from the body of the setting and avoid thermal strain in the brickwork structure. The development of high chromium steels which are necessary for the hot end of the recuperator has made metal recuperation a practical possibility. They have been used successfully in glass furnaces, where the high temperature of the process makes heat recovery from the waste gas even more important than in the carbonizing process. At Prague a setting of Glover-West retorts is provided with metal recuperators to exchange heat between waste gas and cold clean producer gas generated in external producers. A further state of development is to be found in a counter current metal recuperator exchanging heat between waste gas and secondary air in a setting of West-Vertical retorts at Tilburg, in Holland.

It is clear that continuous vertical retorts have greater possibilities of reduction of fuel consumption to record low figures than static systems. But since fuel per therm has more importance than fuel per ton we must not lose sight of the superior gas-making results of intermittent systems, which, to use Dr. Pexton's own yardstick, obtain a Hydrocarbon Enrichment Value 2 therms higher than continuous plants. The importance of utilizing the sensible heat in the coke, however, draws special attention to those semi-intermittent systems which include coke-cooling chambers.

Regenerative heating on coke-oven principles has been applied to the continuous vertical retort system, and even though the producer gas must of necessity be cooled and cleaned, the fuel consumption in the latest installation in Rome is only 9.5% on Dr. Pexton's basis. The plant was carbonizing Durham coal. In this case no waste heat steam was raised and this should be taken into account in making comparisons, though the credit which should be given for waste heat steam is a debatable point.

A few remaining points. I am doubtful whether in the mechanism of coke cooling in vertical retorts we can regard the endothermicity of water gas production as being a useful heat-recovery agent. Rather do I imagine that the water gas reaction is occurring in upper outer sheaths of coke, and therefore impedes heat transfer to the centre of the charge.

In the ingenious prediction of fuel consumption of different carbonizing systems I wonder if the heat contribution of coal gas leakage can be ignored.

Mr. **L. Muir Wilson** (South Metropolitan Gas Company): Dr. Pexton has shown that of several types of plant used to carbonize coal some are far more economical in fuel than others. When one considers the venerable antiquity of our Industry this is to be expected, but it is astonishing to think that the least efficient types he mentions, and types even less efficient than he mentions, are still being erected—plants whose fuel consumption is twice as great as the best he mentions. To illustrate the dimensions of the possible losses, let us assume that a unit carbonizes 50,000 tons of coal per annum and the fuel consumption is 11%, thus 5,500 tons of fuel are used for heating; if the fuel consumption is as high as 20%, then the fuel consumption is 10,000 tons per year. This represents at to-day's prices for coke an additional expenditure of approximately £9,000 per year on a comparatively small installation, to say nothing of the loss to the war effort.

Attempts to justify such a state of affairs are often made on the grounds that the extra coke consumed is recovered as steam from the waste heat. But waste heat it is rightly so called, for this is not an efficient method of turning heat into steam; moreover this extra coke, since the poor coke has already been used, is all good coke, which would sell at the top price.

When a certain production of waste heat is unavoidable, by all means turn it into steam, but don't let us go out of our way to make waste heat. If the steam produced is not enough, then raise the extra steam in modern independently fired boilers which can be regulated to suit the demands. Often, however, gas-works are just as prodigal with their steam, especially when it is made from waste heat, as with their coke, so make sure first of all that the extra steam is really necessary, and is not going to be wasted in the strange manner in which steam is so often frittered away—for instance, as steam undecomposed in the steaming process.

Dr. Pexton's figures, of which there are plenty, are most valuable. My own coke-oven experience and gas-works experience compels me to agree with them. I trust most sincerely that they will be taken notice of and acted upon throughout the Gas Industry. Perhaps he will forgive me if I say that in the South Metropolitan Gas Company we consider that the heat lost by radiation and convection (Table VI) from horizontal retorts is nearer 9 therms per ton than the 7 he gives. This disagreement no doubt arises over the difficult matter of the mouthpieces. Some of the heat lost from these castings comes from the hot gases and some is conducted from the face of the setting, and it must be very much a matter of opinion how the loss should be apportioned between these two. We find that our fuel consumption on this type of setting with inside producers and no recuperation is nearer 15 than 14, and with outside producers on recuperative settings the figure is nearer 19.

I gather from Dr. Pexton that he does not think much can be done to improve the efficiency of horizontal retorts. I agree. Additional insulation may help a little, but so long as the hottest part is covered with mouthpieces like the gills on a radiator we have a nearly insurmountable problem. They also present too large a surface area in proportion to the quantity of coal they are capable of dealing with. And they do not lend themselves to a good waste heat recovery system. With outside producers and change-over regenerators one of our experimental settings gave an overall fuel consumption which suggested 12% in practice, but the large amount of valve gear necessary was not justified by the small weight of coal charged in proportion to the cost of the valve gear. Full recuperation and outside producers give a coke to coal figure of about 19%, which is unreasonable, while in-built producers give a figure of about 15% if all goes well. My experience with recuperators is not very happy, for they rapidly deteriorate and soon give figures which suggest that expensive repairs are not far away. Recuperation will no doubt, as Dr. Pexton mentions, be a great advance on Cowper stoves for blast furnaces. Here it is usual to keep two or three stoves on heating gas while one is being used for pre-heating the blast. A good metal recuperator should reduce the size of the plant considerably, and should stand up to the conditions when burning blast furnace gas which does not give an intense flame and when the air need not be pre-heated to much over 800°C. Good recuperators, too, would be the ideal for continuous furnaces such as on vertical retorts. But regenerators have one very special advantage for the heating of static charges, inasmuch that the act of reversal makes it possible to bring all parts of the furnace up to the same temperature. Our success with regenerators on horizontal retorts was mainly due to this fact, and it was the absence of cooling off towards the jack arch zone which gave us greater throughput for the same radiation losses. Hence the improved fuel consumption. Incidentally the chimney temperature was 300°C., but good recuperators might be made to do this.

Dr. Pexton thinks that the fuel consumption of continuous vertical retorts can be improved still further. Certainly there should always be room for improvement. I feel that coke-oven plant may be able to keep its head in this respect. The main handicap here is the inefficiency of the outside producer plant. This can be improved by using high-pressure boilers to cool the producer gas down to 250°C. and using the heat in the gas below 250°C. to saturate and warm the blast.

I cannot close without saying that I feel this matter of coke wastage on works to be of great urgency. Dr. Pexton has confirmed my opinion that it is possible to carbonize coal with a coke to coal ratio of better than 11%, and I hope that no one will ever consider building new plant without aiming at and bettering this figure. After all, Dr. Pexton does not suggest that this figure is obtainable on theoretical grounds only, but he states, as I once stated in a Paper, that it has been achieved in practice. Figures of less than 11% have been recorded on well run plants consistently for the last twenty years, so there is nothing novel or frightening about it. I can assure Dr. Pexton that he is doing a very fine piece of work in bringing these figures home.

Dr. **F. R. Weston** (Gas Light and Coke Company): Dr. Pexton has given 250–300°C. as the temperature of the coal gas leaving continuous vertical retorts carbonizing run-of-mine Durham coals, and mentioned that with screened coals, lower temperatures would be obtained. It may be of interest to give some figures for the gas offtake temperatures obtained during experiments on the carbonization of various coals in a continuous vertical retort. These were:

Run-of-mine Durham coals . . .	270°C.
Screened Durham nut coal . . .	250°C.
Screened non-swelling nut coals . .	175°C.
Briquetted non-swelling coal and pitch blends	120–175°C.

It seems probable that 120°C. is about the lowest temperature that can be expected, since during these experiments it was found that at first trouble was experienced with tar refluxing on the cold briquettes entering the retort. This was cured by increasing the length of the division plate between the coal feed and gas offtake from its normal 15 in. to 3 ft. when steady working resulted. If we take the case of 120°C. as against the 275°C. for Durham coal, calculation shows a reduction of 1 therm per ton in the heat carried away by the gas leaving the retort. With a heating efficiency of 43% this means a saving in producer fuel of 2.5 therms per ton, or 7.5%.

Further, since with these non-swelling briquettes the throughput was increased some two to two and a half times over run-of-mine Durham coal, the radiation losses should be reduced in proportion to this increase. This gives a further reduction of 18%, or a total reduction of 25% in producer fuel.

As the experiments were carried out on one retort of a large bench it was not possible to confirm these calculations. Results have been obtained, however, on a large installation of vertical retorts carbonizing firstly 100% Durham and then 100% Yorkshire run-of-mine coals. In this case the throughout rose from 8 to 9 tons per retort per day. Taking the figures given for Durham coal in Dr. Pexton's Paper, the radiation losses are reduced to

$$8/9 \times 4.6 = 4.1 \text{ therms per ton}$$

for Yorkshire coal. Further the coke yield was 13.2 cwt. per ton as against 14.6 cwt. per ton for Durham coal; hence the heat carried away in the coke is $\frac{13.2}{14.6} \times 6 = 5.4$ therms per ton. The loss in the coal gas remains at 3.5 therms per ton, and so the total heat utilized is 13.0 therms per ton.

Therefore the fuel consumption for Yorkshire coal should be $\frac{13.0}{14.1} \times 33 = 30.4$ therms per ton or 10.4%.

In practice the figure was 10.0%, or 0.38 therms per therm of gas made. This low consumption was accompanied by 1,000 lb. of waste heat steam per ton of coal.

Mr. **E. E. Calvert** (Gas Light and Coke Company): Dr. Pexton states that sensible heat carried by the waste gases depends on their volume and temperature. These items depend on the quality and quantity of the producer gases put into the settings or plant. In producers, both built-in and outside, even with a curtain arch, the volume and quality of the producer gas varies over a cycle of cleanings, there being a bad period for some time after cleaning the fire, as much as four or five hours on an eight and twelve-hour cleaning cycle. For purposes of his calculation he has taken the analysis of producer gas as 5.6% CO_2, 26.6% CO, 7.8% H_2 and N_2 at 60%. This may be a good average over the whole period between cleanings.

With producers of a great area of 34 sq.ft. there are difficulties of even working of the fire over the whole area, partly due to the human element of cleaning fires, uneven admission and control of primary and secondary air and water or steam. Until one revolutionizes the present step-grate producers to as near a mechanical producer as possible the control of quantity and quality of producer gas could not be considered perfect. This meant that we have not yet found our ultimatum in the control of the heating of some of the methods of carbonization, this being one of the chief factors in obtaining high results, both thermal and economical. Similar poor results can be the practice in horizontal plants with producers of 15 to 18 sq.ft. grate area.

Dr. Pexton points out that there can be 50% or 70% fuel wasted when there is 100% excess secondary air. Have we not to find a far higher standard of the method of control of the secondary and primary air? We want some apparatus that will give us as near a continuous control of the analyses of the gases either at the inlet or outlet of the plant.

Dr. Pexton states that a non-recuperative setting requires 29% more producer gas for the same useful application of heat within the

combustion flues, and to obtain this means an increase of 25% in fuel, thus showing the necessity for a high efficiency in regeneration or recuperative systems.

With regard to the spraying of the crude gas with tar and liquor immediately leaving the retorts he shows the need for doing this for the point of reducing the heat loss. I feel this is a valuable point which is not always appreciated, sprays more often being put in purely for the purpose of keeping gas mains clear.

The heat loss by convection plus radiation is shown for the four different carbonizing plants, horizontals being the worst. These are most interesting figures. To prevent this loss is another necessary factor that has to be tackled. It should be possible to reduce these, perhaps with constructional alterations. Methods of insulation have been tried and found wanting. I feel we are far from the perfect setting, especially in horizontals, that reduces the heat loss by convection to a minimum.

Mr. **J. S. Thorman** (Deputy Chief Engineer, Gas Light and Coke Company), in proposing a vote of thanks to Dr. Pexton, said that in the whole of his long experience of gas manufacture he had never heard a Paper delivered with such mastery of the subject. In his opinion the principal duty of a gas engineer was to develop and make use of heat interchange and thereby reduce fuel consumption; heat interchange was a study that had always fascinated him. Dr. Pexton, in his outstanding Paper, pointed out so clearly and positively where heat losses continued to occur, and indicated to gas engineers and their contractors how such losses could be recovered by improvement in design of carbonizing plant, with the result that the average fuel consumption on gas-works in this country could be reduced by at least 50%.

He would like Dr. Pexton to include in his reply to the discussion some reference to dry coke cooling, and also data for the efficiency of a step-grate producer blown with an air steam mixture.

Mr. **N. Willsmer** (Gas Light and Coke Company), in seconding the vote of thanks, said he would like to thank Dr. Pexton on behalf of the engineering staff of the Company for his contributions to the solution of some of their works problems. He always noticed, with very great pleasure, how both staff and workmen entered into the spirit of Dr. Pexton's search for truth, and no effort on their part was ever spared to assist his investigations.

Dr. **Pexton** thanked the President and the meeting for their kind reception of this Paper, which he explained was the result of an organized piece of research in which a very large number of people had co-operated. In writing the Paper he had in mind the student entering the Industry, and had tried to present the kind of information he would have liked to receive on entering the Industry.

Dr. **G. W. Anderson** (Gas Light and Coke Company), in a written contribution, stated: Attention should be focused on the Author's attempt to dispel—it is hoped once and for all—the all too prevalent notion that regenerators are more efficient than recuperators. Although in certain circumstances regenerators may possess advantages—*e.g.*, with regard to space and cost—they cannot claim superiority over recuperators from a point of view of thermal efficiency. In fact, it is probably generally agreed that if a metal—and hence gastight—high temperature recuperator would become a commercial proposition, the regenerator, with its cumbersome valve gear, would disappear.

As matters stand to-day, both types show a relatively low thermal efficiency. The Author's figure is not readily apparent from the data given, but according to my own findings it is not greater than 60% to 70%, but usually less than that. A higher efficiency could only be obtained at the expense of unwieldiness, which would also lead to an increase in the heat loss by radiation, convection, and conduction. In any case, the cost of installation is not low, so that designers have been prompted to dispense with recuperators and regenerators when other means are available to pre-heat the secondary air in order to ensure the necessary degree of flame temperature for heat transmission.

Dr. Pexton instanced the continuous vertical retort. Another example is the horizontal setting of the South Metropolitan Gas Company, which has what might be called semi-recuperators for pre-heating the secondary air, consisting of horizontal ducts placed below the bottom retorts. In this simple and inexpensive device the heat transmitted to the secondary air is partly from the setting itself—*i.e.*, primary heat—partly from the inside producer, and to a very limited extent from the waste gases passing in a horizontal flue towards the front of the setting. They run up the front of the setting and then, in a horizontal flue, on top of the setting back to the centre, where they enter the main waste gas flue. This arrangement envelops a large part of the setting, and thus reduces radiation losses to such an extent that, notwithstanding the absence of full recuperators, the fuel consumption is no greater than for recuperative settings, being of the order of 14 to 15 lb. of coke per 100 lb. of coal, the figure given in Dr. Pexton's Paper.

The principle adopted is capable of further development, and might well be included in the recommendations made by the Author. Such steps would materially reduce the fuel consumption of all types of settings, as radiation losses form a large percentage of the total heat requirements. According to the figures given in the Paper, they are as high as 32.6% in the case of continuous vertical retorts, being the maximum for all types. It is noteworthy that they are lowest for coke ovens, 15.55%—due, of course, to the relatively small surface are exposed per unit chamber capacity—*i.e.*, per unit weight of coal carbonized.

In passing, I should like to remark that radiation losses from settings can be much higher than the figures mentioned by Dr. Pexton. In a survey of continuous verticals that I made some years ago radiation losses amounted to between 5.6 and 8.99 therms per ton of coal, increasing as it were with the degree of steaming. In this connexion it is worth remembering the work of the Fuel Research Station, which showed that a considerable reduction in radiation loss—viz., over 21%—was achieved by replacing cast-iron sight boxes by clay boxes and plugs, now a common fixture.

With the knowledge available on the subject, it would seem profitable to contemplate the heat balance of a carbonizing unit of maximum thermal efficiency. In a Paper presented to the Southern Association of Gas Engineers and Managers in March, 1936, on Fuel Economy on Gas-Works, I gave the following heat account for a setting, which, in my opinion, should and could be the designer's aim with a total fuel consumption of 28 therms per ton of coal, instead of 32 to 41 as stated in Dr. Pexton's admirable and instructive Paper.

HEAT BALANCE OF IDEAL CARBONIZING PLANT (Outside Producers).

	Therms per Ton of Coal.	Percentage of Heat Input.
Fuel to producers	28.0	100.0
Heat obtained as steam	3.75	13.4
Process loss	3.25	11.6
Heat transferred to setting ...	21.0	75.0
Heat transmitted to coal charge	15.2	54.2
Heat lost by radiation	2.0	7.2
Stack losses	3.8	13.6
	21.0	75.0

Mr. **J. R. Owen** referred to a vertical retort installation completed in August, 1941, comprising 32 Glover-West vertical retorts of the 50/56 in. model in four settings of eight retorts each, in units of four. Four producer-gas generators, of the step-grate type, equipped for pressure operation are arranged in a single battery at one end of the retort bench, each individual producer directing the fuel gas into a common distributing flue with branches extending for the full length of the retort settings at back and front. Necks connect the distributing flues to the producer gas uptake flues of the individual units. The settings embody the latest developments of design, being heated on the dual and balanced system, in which producer-gas uptakes are arranged in both front and back walls of the settings and the waste gas uptakes centrally. External waste gas flues connect the settings to a steel chimney and/or waste heat boilers.

Producer gas and secondary air are admitted to the combustion chambers at both ends through plugs with graduated orifices, the waste gas uptakes being arranged centrally in the combustion chambers. Chambers are arranged round the lower portion of the retorts for the circulation of secondary air, prior to its entering the uptakes in the division walls between the settings.

The retorts are built of "Derbyshire S" refractory materials to the "Key-Block" design, apart from the top 1 ft. 2 in. and the bottom 2 ft. 8 in., which are built of Derbyshire hard-burnt fireclay. The setting is insulated by "Dome" insulating bricks.

Unfortunately we have no means at our disposal for measuring the quantity of gas made in the retort house, the gas from this and two smaller vertical houses being mixed prior to metering. The results obtained, however, can be judged from the following, which apply to the combined output from the three houses, bearing in mind that a considerable improvement in the works results has accrued since this house was put to work.

During the month of September, 1942, the following average results were obtained for the works:

Make per ton of coal . . .	15,640 cu.ft.
Calorific value	521.3
Therms per ton	81.5
Benzole recovered	2.36 gallons
Tar	14 „

Owing to the limitations of our benzole recovery plant, it has not been possible to attempt to obtain a higher yield of benzole, but no difficulty is anticipated in producing a gas having a calorific value of 535 to 540 B.Th.U. per cu.ft. for benzole recovery.

Several short duration tests have been carried out to ascertain the throughput of coal per retort per day and also the fuel consumption.

The average throughput of coal (which consists of 30% Durham and 70% Yorkshire) worked out to be 5 tons 10 cwt. per 24 hours, and the fuel consumption expressed in terms of run of retort coke as supplied to the producers varied from 1.85 cwt. per ton, or 9.25% to 2.2 cwt., or 11.0%, the average being around 10%.

The above low fuel figures are undoubtedly due to the excellent heating system and the pre-heating of the secondary air to approximately 600°C. at the bottom of the secondary air uptake flues.

FUEL ECONOMY IN GAS WORKS

No. 1

We are indebted to the Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd., for permission to reprint a series of notes specially compiled for them by G. M. Gill.

FUEL economy is the order of the day. The object of this series of articles is to discuss and suggest various methods of saving fuel. It is obvious that good carbonizing makes for economy in fuel, and therefore it may seem that these articles are merely putting forward suggestions for improving carbonizing efficiency, without any direct reference to fuel economy. A little consideration will, however, convince the reader, as it has the Author, that fuel economy in gas-works is very closely interlinked with the efficient carbonizing of coal. If you have one, you have the other.

Thermal Efficiency

A fairly clear picture of what is now being done can be obtained by working out the thermal efficiency in any particular gas-works, and having done this, to set about improving it.

Thus, a certain number of therms comes into a works in the form of coal, or oil if this be used, for gas making, and of electricity, should this be bought from the electricity supply undertaking. If any coke is bought, this must be included.

The total quantity of therms brought into the works is calculated, as also are the therms of gas delivered into the mains, the coke sold, and breeze, if any, and also the tar and benzole sold to customers. From the difference between the two sets of figures can be calculated the thermal efficiency of the gas-making process in the particular works.

Obviously the heating value of coal and coke varies a good deal, particularly in these days, when some collieries at any rate do not worry overmuch if the ash content is a good deal above pre-war standard. Extra ash in the coal would lower the yield of gas and tar from a ton of coal, but it would tend to increase the weight of coke, as all the ash in the coal remains, of course, in the coke. Consequently, if the coal has excess ash, so also has the resultant coke, though to a proportionately greater extent. On the other hand, if coke with a high ash content is used as fuel in the producers, it results in higher fuel consumption and a consequently lower quantity of coke for sale. As a consequence, thermal efficiency figures are corrected to some extent by the fact that if the estimate of therms in the coal is too high, so also is that of the therms in the coke on the other side of the balance sheet.

Mr. Thomas Hardie, when Chief Engineer of the Gas Light and Coke Company, read a Paper on "Some Phases of Modern Practice in Gas Manufacture" before the Institute of Fuel in 1926 (see "GAS JOURNAL," Vol. 176, p. 692). In that Paper, Mr. Hardie gave figures to show what he considered was satisfactory working in various types of plant as used in gas-works. These are as set out below and refer to modern plant in large gas-works of various types :

	Without waste heat recovery.	With waste heat recovery.
	%	%
Efficiency of horizontal retort plant . .	78.4	82.5
" " continuous vertical retorts .	..	85.6
" " carburetted water gas plant .	59.9	69.2
" " blue water gas plant . .	46–50	60

The above figures would not be applicable to small works, but in the Author's opinion it could be considered that for works making less than 100 million cu.ft. per annum satisfactory figures would be somewhat as follows:

	Over 30 mill. cu.ft. per annum.	Under 30 mill. cu.ft. per annum.
	%	%
Horizontal retort plant without waste heat recovery	73	67
Continuous vertical retort plant with waste heat recovery	80	..

The figures set out below are taken from the Paper, and form the basis upon which the thermal efficiency has been calculated in this article. Thus:

1 ton of coal = 30,016,000 B.Th.U.—*i.e.*, 1 lb. = 13,400 B.Th.U.
1 gallon of oil as used for carburetted water gas manufacture = 165,000 B.Th.U.
1 gallon of tar = 185,000 B.Th.U.
1 ton of coke = 28,000,000 B.Th.U.—*i.e.*, 1 lb. = 12,500 B.Th.U.
1 ton of coke breeze = 22,400,000 B.Th.U.—*i.e.*, 1 lb. = 10,000 B.Th.U.
1 unit of electricity = 3,413 B.Th.U.

Obviously, stocks must be allowed for in making these calculations. As regards gas, only that quantity which leaves the works for sale should be credited to the works results. This will, of course, be a different figure to the quantity sold, as it will include not only the quantity sold, but also the gas lost from district mains and services. Actually it will be the gas made minus the gas used on the works.

It will be said that the heat units contained in the coal and the resultant coke must vary considerably in accordance with the quality of the coal used, and therefore the results in thermal efficiency between the works using good coal and those using bad coal cannot fairly be compared. That is true, but the Author is urging that the value of these figures is not so much in comparing one works with another, but in a particular works comparing its results with its own previous figures, and endeavouring to bring about improvements.

At this stage it will be advisable to give examples from which this method will be more easily understood.

WORKS A

A works in which a large proportion of carburetted water gas is made and all coal gas is made in a horizontal retort plant.

Thermal Efficiency Worked Out on 1941 Figures

Declared calorific value of gas supplied = 465 B.Th.U.
Coal gas made = 497,066,000 cu.ft.
Carburetted water gas made = 418,797,000 cu.ft. = 45.73% of total.
Gas made per ton: 65.50 therms, including benzole.
Coke made for sale per ton of coal: 9.66 cwt.
Tar made per ton of coal: 10.00 gall.
Coke used per 1,000 cu.ft. carburetted water gas made: 36.83 lb.
Oil used per 1,000 cu.ft. carburetted water gas made: 1.36 gall.

	Therms.
Coal carbonized = 39,228 tons. $= \frac{39,228 \times 30,016,000}{100,000} =$	11,774,676
Oil used for gasmaking = 569,488 gallons $= \frac{569,488 \times 165,000}{100,000} =$	939,655
Electricity purchased = 79,568 units. $= \frac{79,568 \times 3,413}{100,000} =$	2,715
Coke purchased = 5,276 tons. $= \frac{5,276 \times 28,000,000}{100,000} =$	1,477,280
Gas purchased	36,409
Potential energy in coal and oil used and electricity and coke purchased	14,230,735
Gas sent out*	4,222,354
Benzole sold	37,833
Coke sold = 17,335 tons $= \frac{17,335 \times 28,000,000}{100,000} =$.	4,853,800
Breeze for sale	*Nil*
Tar for sale = 449,440 gall. $= \frac{449,440 \times 185,000}{100,000} =$.	831,464
Total therms sold	9,945,451

Thermal efficiency of plant:
$= \frac{9,945,451}{14,230,735} \times \frac{100}{1} = 70\%$ approx.

* This figure is the gas made minus the gas used on works.

WORKS B

A works in which all gas is made in continuous vertical retort plant.

Thermal Efficiency Worked Out on 1941 Figures

Declared calorific value, 450 B.Th.U.
Coal gas made = 443,830,000 cu.ft.
Gas made per ton of coal: 84.35 therms, including benzole.
Coke made for sale per ton of coal: 9.11 cwt.
Tar made per ton of coal: 18.77 gall.

	Therms.
Coal carbonized = 23,965 tons. $= \frac{23{,}965 \times 30{,}016{,}000}{100{,}000} =$	7,193,334
Potential energy in coal used	7,193,334
Gas made = 1,997,235 therms „ used = 68,427 „	
„ sent out = 1,928,808 „	1,928,808
Benzole	24,364
Coke = 10,922 tons $= \frac{10{,}922 \times 28{,}000{,}000}{100{,}000} =$	3,058,160
Tar = 450,000 gallons $= \frac{450{,}000 \times 185{,}000}{100{,}000} =$	832,500
Total therms sold	5,843,832

Thermal efficiency of plant:

$$= \frac{5{,}843{,}832}{7{,}193{,}334} \times \frac{100}{1} = 81.2\%.$$

WORKS C

A very small works in which only one small retort setting is working.

Thermal Efficiency Worked Out on 1941 Figures

Quality of gas supplied: No declared calorific value—average of 24 tests during year = 494.3 B.Th.U.
Coal gas made = 5,427,400 cu.ft.
Gas made per ton of coal = 12,060 cu.ft.
Coke made for sale per ton of coal = 6.22 cwt.
Tar made per ton of coal = 10.97 gallons.

	Therms.
Coal carbonized = 450 tons $= \frac{450 \times 30{,}016{,}000}{100{,}000} =$	135,072
Potential energy in coal used	135,072
Gas sent out* = 4,976,400 × 494.3 B.Th.U. per cu.ft.	24,598
Coke sold = 140 tons $= \frac{140 \times 28{,}000{,}000}{100{,}000} =$	39,200
Tar sold = 4,940 gall. $= \frac{4{,}940 \times 185{,}000}{100{,}000} =$	9,139
Total therms sold	72,937

Thermal efficiency of plant:

$$= \frac{72{,}937}{135{,}072} \times \frac{100}{1} = 54\%.$$

* This figure is the gas made minus the gas used on works.

N.B.—The thermal efficiency is low, but is inevitably so, as the one setting (four retorts) at work is only working at 40% to 60% of its capacity, and is shut down for some hours at night.

The broad idea to have in mind in connexion with this matter is that a certain amount of therms enters the works in the form of coal, and sometimes oil and electricity purchased, and it is obvious that an efficient manager wants to send out of the works either underground in the form of gas or overground in the form of coke and tar as many therms as possible per 100 therms delivered in the form of raw material.

Having calculated your own thermal efficiency, you will then have a reasonably clear idea of the scope for further economy in fuel utilization. It is suggested that such figures should be calculated at fairly frequent intervals. Yearly, half-yearly, or even quarterly figures are not frequent enough. It is suggested that these figures should be based upon monthly results as being the best period for checking up in this matter.

Do not be discouraged because the calorific value of the coals you are using or the coke, &c., you are selling is not known to you. Your own monthly calculations will at least be comparative month by month, and will give you guidance as to your progress or otherwise in this matter.

FUTURE GAS-WORKS POLICY*

By DAVID L. DICKSON, Airdrie

FROM a national viewpoint a radical change visualizing the immediate displacement of raw coal by gas is most unlikely, although from a scientific viewpoint it would undoubtedly be the best method of processing coal yet known and give greater conservation of this all-important fuel. Opposition to this change would be given by the colliery owners, who would lose their domestic market, which is estimated in the region of 35 to 40 millions of tons of raw coal per annum, and who would suffer a loss in sales of 15 millions of tons of coal per annum. Not only so, it is doubtful if the general public would respond to such a scheme, since the overwhelming majority would be in favour of keeping at least one coal fire. A compromise, however, could be made by utilizing smokeless fuel and gas, with still a large saving on raw coal used. This, it has been estimated, would result in a saving of approximately 9 millions of tons per annum. One other important fact which must not be lost sight of—it would remove the smoke-laden atmosphere associated with cities and towns and make for a much healthier community.

It is interesting to note that Dr. Foxwell, in a Paper presented to the Institute of Fuel entitled "Smokeless Fuel for Post-war Reconstruction," gives the efficiency of modern electrical generating stations at 25%, while stating this could be increased if more conservation of the waste products from this process were practised, as, for example, district heating. He qualifies this, however, by saying that the application of district heating by utilizing the steam or hot water is limited to heating neighbouring buildings. Because of this he comes to the conclusion that the provision of post-war domestic fuels will therefore be considered as based on carbonization, though capable of augmentation from other sources, since carbonizing would conserve coal, provided both the gas and coke were satisfactorily used, while electricity for heating is wasteful of coal.

Assuming the foregoing picture to represent future developments the scope of gas would be enormous, and efficiency of gas production is obviously of paramount importance. Gas production would more and more be a specialized job, and it would be necessary to decide from such data as we now possess the best and most efficient plants for gasmaking, while keeping in mind that efficiency of production or conservation of fuel would come first, and cost into the holder next. A review of such plants would, I believe, bring out the fact that two or more systems of carbonizing would be necessary, since the coke produced would require to meet different markets. Also, we must keep in mind that we would require to deal with all classes of coal, highly coking, semi-coking, and non-coking, and this with the highest efficiency.

It would also mean, in view of the wide range of prospects, that there would be overlapping between the coke oven industry and the Gas Industry, and an alliance would require to be made, or else a Ministry of Fuel Department formed on a national or regional scale to settle the production problems arising. It would not be policy for the Gas Industry to allow the manufacture of its main commodity, gas, to be undertaken by coke ovens, since it would then have no control over its production costs. Secondly, coke ovens are generally colliery owned, and this would mean that the cost of gas would be decided for us, since the collieries would control both the raw product, coal, and the finished product, gas.

The matter will require to be settled on a national basis and each given its proper sphere; otherwise colliery companies could set up as gas producers either with coke oven plant or, say, vertical retort plant, and, being in control of the raw product, cut production costs lower than those obtainable in gas-works. Ultimately the manufacture of coal gas could be monopolized by collieries.

The problem confronting fuel technicians is what types of plant are necessary to deal with the varying classes of coal and meet the different coke markets, while giving maximum efficiency. We have the following plants:

Coke ovens, vertical retorts, vertical chambers (static), vertical chambers (continuous), and a combination of these with independent water gas generation.

We must have a combination of plant that will give consistent results and be capable of maintaining a steady calorific value, specific gravity, and a low inert content. It is not proposed to consider complete gasification, since this is not yet economically practical and investigations are still proceeding.

Coke ovens.—This type of plant produces coke of a good mechanical strength necessary for blast furnaces, and is usually associated with steel works. The coals used may consist of varying percentages of coking coal and non-coking coals, but the success of this plant depends on the availability of good coking coal, whereas our pressing need for proper conservation of fuel is to ensure efficient methods of making gas and coke from all classes of coal. Coke produced from this type of plant is best suited for many users, domestic and otherwise.

* From a Paper to the Scottish Junior Gas Associations.

Present methods of coke oven production are tending to centralize the manufacture of by-product coke and the manufacture of steel, and by so doing great economies are made, since gases previously blown into the atmosphere and lost are now being usefully harnessed, with a consequent all-round increase in efficiency. The ideal in this combination would therefore appear to be the "balanced" plant, producing finished steel, the only solid fuel entering being that necessary for the coke ovens. A plant approaching this ideal is running in Scotland, and it might not be out of the way to give a brief outline of the method employed by this works in utilizing their fuel efficiently. A Joint Paper entitled "Coke Oven and Blast Furnace Gas, Distribution, Control, and Application Problems" was recently submitted to the West of Scotland Iron and Steel Institute by W. B. Wright and T. F. Pearson. The Paper is well worthy of study.

Interesting features are—

(1) The coke ovens are designed to be heated by either coke oven gas or blast furnace gas. In this case coke oven gas is used, and approximately 47% of the total make of gas is employed for this purpose. The remainder is then used either in open hearth or reheating furnaces. The only time there is a surplus is at the weekend, when those furnaces are put off. Unfortunately coke ovens must carbonize continuously, being less flexible in this manner than other forms of gasmaking plant.

(2) Blast furnace gas is also collected, and in turn distributed to the following units: Hot blast stoves, soaking pits, open hearth furnaces, and boilers.

(3) Alternative fuels are provided for emergency and peak loads in the form of producer gas, coal (gum or duff), fuel oil, or tar.

From the tables given in their Paper it would appear that the only additional solid fuel for normal working of this plant is that necessary for producer gas used in the open hearth furnace, which is mixed with coke oven and blast furnace gas, in this way acting as a carburetting medium and increasing flame luminosity.

Unfortunately, however, efficiency figures for this plant have not been given and consequently one hesitates to pass an opinion, but undoubtedly this method shows a greatly increased efficiency over past working. The chief disadvantages of coke ovens from a gas producer's point of view are lack of flexibility in control to meet demands, and the difficulties one would experience in getting the proper coal for carbonizing. I believe from a maintenance point of view that some ovens have seen from 15 to 20 years' consecutive service, so this speaks well for their rigid form of construction. Against this, however, with gas being purely a residual, one wonders what the inert content of the gas would be at the end of this time. Doubtless with more stringent control over gas production it might be deemed advisable to reset more often. From experiments carried out on coke ovens at Beckton the conclusion reached was that for the purpose of gas manufacture, coke ovens are not likely to prove superior to certain other forms of carbonizing plant unless specially favourable prices are obtained for the coke produced.

Continuous Vertical Retorts are producing approximately 85% of the gas in Scotland and have been found capable of dealing with all classes of Scottish coal, giving high thermal efficiencies even in small works, meeting differences in calorific value from 400 to 500 B.Th.U.—an important point where close control must be maintained over the production of coke, since in Scotland pre-war the chief difficulty was to get rid of coke at an economic price.

Vertical Chambers (*Stati c*) are not so common in Scottish practice, but undoubtedly they serve as a medium for carbonizing heavy coking coals and slacks or blends, and where steaming is practised they give a higher thermal yield of gas per ton of coal carbonized while producing good quality coke suitable for the domestic market.

Vertical Chambers (*Continuous*) represent a new process of carbonization recently described in the "Gas Journal." The yields obtained from this plant are very good indeed, and it has the advantage that the heat in the coke is made use of, allowing coke to be discharged cool, at the same time giving the maximum water gas reaction. This overcomes the difficulty experienced with coke ovens and vertical static chambers, where the heat of the coke discharged is lost unless a Sulzer or similar type of waste heat plant is installed.

Efficiency tests with vertical retorts have borne out that 85% of the total therms as charged can be obtained for re-sale by this method of carbonization.

There is an economic limit, however, for various classes of coal when steaming verticals, and after this has been passed it is cheaper both from an £. s. d. and total thermal point of view to generate water gas externally than *in situ*. For Scottish coals and verticals the manufacture of a gas in the region of 425 B.Th.U. to 475 B.Th.U. has been considered the most suitable. This in the past has been decided from an economic view rather than thermal, local conditions, primarily the demand for coke, being the determining factor. It would, however, appear that with greater control over the coal and coke market, and once conditions had been stabilized, it would be quite feasible from a thermal efficiency viewpoint (keeping in mind coal conservation) to state for any given area the calorific value of the gas to be manufactured.

This war has shown that centralization can be carried too far, and I for one say that for the future load we are likely to be called upon to bear, a super station is dangerous and not likely to be any more efficient from a thermal point of view than a small undertaking. I would therefore suggest, assuming large increases of gas and coke are required, that the existing thermally efficient works be increased to the utmost capacity, and only after that consider building super stations.

Pit head carbonizing has been suggested as being most economical. This is doubtful, since no one pit would be capable of meeting all the requirements of a super station, and hence railway freightage would be incurred. At the present I know of one Scottish coke oven situated well in the coalfields which is bringing coal from Durham. Can such anomalies be entirely removed from pit head carbonization, short of complete gasification?

The Gas Industry in the past has been too reticent. An Industry which has for sale approximately 240 therms out of 300 is doing very well and has no need to hide its head in shame. Rather it should be advertising its efficiency. The chief reason for the popularity of large units is economy of cost. This has been an important factor in the past, and, of course, cannot be lightly thrown aside when considering future policy. But centralization and merging of interests have become so common that in effect monopoly in certain branches of Industry and associate branches has been created which has stunted private enterprise.

In future gas manufacture I visualize more scientific and technical control both over carbonizing and in the preparation of residuals, with no residuals being allowed to run to waste. If regional planning of production has to come, the Gas Industry must have the foresight and the leaders that will ensure maximum help and co-ordination from within the Industry.

Distribution

On the distribution side we must be prepared to meet changes, and be prepared to grapple with them immediately. For this purpose I suggest more co-ordination between gas undertakings, for I think most of us are agreed that competition as between electricity and gas will be more acute unless each is confined to certain limits—and that day is as yet far removed.

I recently asked several neighbouring gas undertakings to let me know their present method when dealing with services, &c., and from the replies I found that there was a variation in policy in nearly every case. Since each of those areas is subject to keen electrical competition, surely it should be possible for them to get together and arrange a standard set of conditions. The question of an adequate service to property is the first essential, and it should not be impossible to agree to a common standard. A recognized rate for certain sizes of service could be arrived at, covering even large industrial users. Appliances are being purchased by each undertaking at the same cost. It should not be impossible to agree on a simple hire or hire-purchase scheme. For example, they could agree to a formula of pricing such as:

Hire purchase: Net cost of appliance + 5% (handling charge) + fixing charge (varying for each article) + interest,

and also come to some agreement regarding the number of types proposed for any scheme. The same could be done for simple hire, and would prevent consumers in one area being discontented because other consumers in a neighbouring town had been able to obtain a better cooker on more favourable terms.

Salesmanship has been sadly neglected in the Gas Industry. Gas has had to sell itself, yet, even with small undertakings, co-operative schemes could be arranged. This has been done in one group of undertakings (all of which are under one control) with marked success. The cost of the salesman (excluding travelling expenses) is met by a levy on each undertaking based on its sales for the previous year, and travelling expenses incurred are charged direct. Every undertaking is then in a position to call on the salesman's services in proportion to the amount it pays. In the future salesmanship and demonstrations will be of great importance, and the Gas Industry must lay its plans now and be ready for action.

We have in the modern gas cooker with thermostatic control the ideal cooking unit, and I believe that no new cooker should be issued without a thermostat. We must, however, go further; we must look for the ideal refrigerator and water heater to meet post-war conditions. The refrigerator must be more reasonable in cost than those we are now marketing.

Undoubtedly in the future we must insist on a steady quality gas (calorific value and specific gravity) with a low inert content, and while in Scotland the sulphur content generally is low, we must remove sulphur entirely, so as to make possible the increased use of flueless heaters. Moreover, a sulphur-free gas would reduce considerably the maintenance cost of refrigerators, water heaters, &c., and allow of increased efficiency.

Further prospects of advancement are in the fields of heating and ventilating. The heating and ventilating of future buildings and houses will gradually veer round to central heating, which, when properly planned and applied, is efficient. It is a load which we should gain.

The industrial side also allows of much expansion in view of the many classes of work. It is gratifying to know that the Gas Industry in Scotland has at last realized this and is now setting up an Industrial Section in Glasgow. But we require the men. There is ample scope for students in the two fields mentioned, and I am certain that, if given the chance, the Junior Associations can provide them.

(A report of the discussion will be given next week)

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Gas Products Prices

The London Market Jan. 25.

The chief item of interest in connexion with the Coal Tar Products market is the issue of a new Government Order, the Coal Tar Products Prices Order, 1942 (S. R. & O., 1942, No. 2509), which came into force on Jan. 1.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The Provinces Jan. 25.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Naphtha and Xylol controlled by the Coal Tar, Naphtha and Xylol Order, 1942, dated Dec. 7, 1942, and operative from Dec. 21. Carbolic acid, 60's, controlled by the Coal Tar Acids Prices (Inland) Order, 1942, operative from May 1. Naphthalene, controlled by the Naphthalene prices (Inland) Order, 1942, datedApril 15, 1942, and operative from May 1, 1942, £19 to £19 10s.—bags free. Anthracene, controlled by the Anthracene Prices (Inland) Order, 1942, operative from May 1. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5¼d.; timber preservation and other purposes 4¾d. to 6d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland Jan. 23.

Throughput is well maintained. Refined tar controlled. Value is 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6½d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6d. to 6½d.; hydrogenation oil, 5.875d. per gallon; all *ex* Works in bulk. Refined cresylic acid is quite active at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha, 6½d. to 7d. per gallon. Solvent naphtha: Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d., Rectified, 2s. 3d. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

Gas Stocks and Shares

Markets opened cheerfully last week and this sentiment continued almost until the close, when some irregularity set in and business became quiet. There was a little more activity among gas stocks and shares, and although the number of upward movements was not on the same large scale as the previous week the market was not without a few good gains. The feature was a rise of 10 points in Wandsworth Ordinary to 97½ on the announcement of an increase in the ordinary dividend for last year, viz., 5% against 4% for 1941.

The following price changes occurred during the week:

OFFICIAL LIST		
Alliance & Dublin Ord.	110—115	+2½
British Ord.	88—93	+1
Gas Light Units	17/—18/-	—/3d.
Ditto 3½ p.c. max.	64—67	+¾
Ditto 4 p.c. Pref.	80—85	+1
Imperial Continental 3½ p.c. Red. Deb.	95—100	+2
Oriental	96—101	+1
South Metropolitan 6 p.c. Pref. ...	90—95	+1
South Suburban Ord.	87—92	+2
Tottenham 4 p.c. Deb.	97—102	—
United Kingdom Ord.	18/9—19/9	—/6d.
Ditto 4 p.c. 1st Red. Cum. Pref. ...	17/6—19/6	+1/6d.
Wandsworth Ord.	95—100	+10
Watford & St. Albans Ord.	100—105	+2
SUPPLEMENTARY LIST		
Cheltenham 4 p.c. Deb.	95—100	+2
PROVINCIAL EXCHANGES		
Bristol 1st 4 p.c. Deb.	101—103	+1
Liverpool Ord.	102—104	+1

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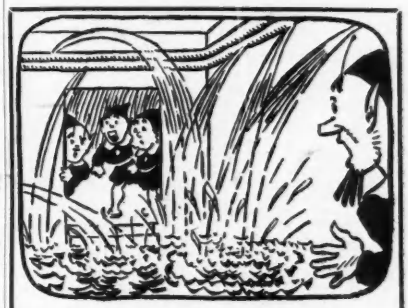

THE "FLUXITE QUINS" AT WORK

"Now, this is a real plumber's joy,
What a lot of nice bursts, my old boy!"
"We're not divers!" moaned EH,
This'll take us all day."
"Not with FLUXITE—you watch!" chortled OI.

For all SOLDERING work—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." It does not "poison" the solder nor corrode the metal—and can be used with safety even on sensitive apparatus.

With Fluxite, joints can be "wiped" successfully that are *impossible by any other method.*

FLUXITE has been used for over 30 years in Government Works and by the leading Engineers and Manufacturers. OF ALL IRONMONGERS — in tins — 8d., 1s. 4d., and 2s. 8d. Ask to see the FLUXITE SMALL SPACE SOLDERING SET — compact but substantial — complete with full instructions — 7s. 6d.

Write for Leaflets on CASE HARDENING STEEL and TEMPERING TOOLS with FLUXITE also on "WIPED JOINTS." Price 1d. each.

The FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 1s. 6d., or filled 2s. 6d.

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IT SIMPLIFIES *ALL* SOLDERING

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FIRE-CLAY & BRICKWORKS

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GAS RETORTS in BEST STOURBRIDGE QUALITY also SILICIOUS QUALITY 81% SILICA

HIGH GRADE INSULATING QUALITY FIREBRICKS

REGENERATIVE TUBES & TILES

PLANT, &c.

FIRTH BLAKELEY, SONS, & CO., LTD. Vulcan Ironworks, Church Fenton, Tadcaster, Yorks.

MANUFACTURERS of Gasholders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.
Sole Makers of the "P.M" semi-water Gas Plant.
Telegrams: "Blakeleys, Church Fenton."
Telephone: Barkston Ash 234 and 235 (Private Branch Exchange). Code: "Bentleys."

ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. *Telegrams:* "Dempster, Elland." *Telephone:* Elland 2241, 2242 and 2243.

BUFFALO EJECTOR

(British Made)

For pumping water or other liquids.
Send for List:—

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Prompt Despatch From STOCK in LONDON For Small Urgent Requirements

HARRISONS (LONDON) LTD.

66, MARK LANE, LONDON, E.C. 3

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APPOINTMENTS VACANT

No. 9251.

APPLICANTS for first-class FOREMAN for 300 million Works advertised on December 9, 1942, are THANKED and the POSITION IS NOW FILLED.

WANTED.—GAS-WORKS FOREMEN, WORKS MECHANICS and HANDY MEN; also skilled SHOVEL CHARGERS and GASMAKERS for small works. Send particulars of experience and wages required to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

THE GAS RESEARCH BOARD

APPLICATIONS are invited for the post of DIRECTOR OF THE GAS RESEARCH BOARD of the Gas Industry.

Only such candidates will be considered as have qualifications and experience justifying a salary of not less than £2000 per annum.

Particulars of the appointment can be obtained from the Secretary, Gas Research Board, Gas Industry House, 1, Grosvenor Place, London, S.W. 1, with whom applications must be lodged not later than February 22, 1943.

ELLESMERE PORT URBAN DISTRICT COUNCIL

APPOINTMENT OF GAS ENGINEER AND MANAGER

THE above Council invite applications from qualified Gas Engineers for the appointment of GAS ENGINEER AND MANAGER to their Gas Undertaking, at a commencing salary of £600 per annum, plus war bonus at the rate for the time being in force, the present rate being £32 10s. per annum.

The appointment is subject to the Local Government Superannuation Act, 1937, and the appointment of a successful candidate will be subject to his passing a satisfactory medical examination.

In the selection of candidates for interview, and in the making of the appointment, regard will be had to the ages of candidates and to their liability or prospective liability for service in the Armed Forces.

Candidates must be thoroughly experienced in the working of vertical retorts (the Council's carbonizing plant consisting of Woodall-Duckham and Glover West Vertical Retorts) and in gas distribution, the sale of residuals and works management, and should have a knowledge of the working of Benzole Recovery Plants and of commercial practice and development in relation to the production and sale of gas and its residuals.

Applications, stating Age, Qualifications, and Experience, and the earliest date at which a candidate could be released from his present appointment to take up a new appointment, and accompanied by *copies* of three recent Testimonials, must be sent to the undersigned, in sealed envelopes endorsed "Gas Engineer and Manager," so as to be received by not later than February 13, 1943.

Council Offices, Whitby Hall, Ellesmere Port, Wirral, Cheshire.
January 21, 1943.

P. J. HODGES, Clerk of the Council.

COUNTY BOROUGH OF SMETHWICK

(GAS DEPARTMENT)

APPLICATIONS are invited for the temporary position of TECHNICAL ASSISTANT. Candidates must have had laboratory experience, and general Gas-works' training. Salary £300 p.a.

Applications, endorsed "Technical Assistant," stating Age, Qualifications, and Particulars of Training, accompanied by *copies* of two recent Testimonials, to be sent to the undersigned not later than February 15.

Gas-works, Rabone Lane, Smethwick.

ERNEST HARDIKER, Engineer and Manager.

COMPANY NOTICES

THE CROYDON GAS COMPANY

NOTICE IS HEREBY GIVEN that an ANNUAL ORDINARY GENERAL MEETING of the COMPANY will be held at the COMPANY'S OFFICES, KATHARINE STREET, CROYDON, on FRIDAY, the 26th day of FEBRUARY, 1943, at Twelve o'clock in the forenoon precisely, to declare Dividends; to elect three Directors and an Auditor in the places of those who go out of office at the said meeting, but who, being eligible, will offer themselves for re-election; and for transacting the general business of the Company.

In accordance with the Accounts General Direction and Order, 1942, No. 2631, no Accounts nor Reports may be published of the Undertaking, but such Accounts, Reports and Documents may be inspected at the Offices of the Company by any person who would, but for this Order, have been entitled to receive information as to the Accounts thereof and would have given to the Company notice in writing of his desire so to do not less than seven days previously.

The REGISTER OF TRANSFERS OF PREFERENCE AND ORDINARY STOCKS of the Company will be CLOSED from the 13th FEBRUARY to the 26th FEBRUARY, 1943, both days inclusive.

Warrants for Dividends, if declared, will be forwarded by post to the Proprietors, or their authorized agents, on 1st MARCH, 1943.

Dated this 13th day of January, 1943.

Chief Offices: Katharine Street, Croydon.

By Order of the Board, FRANK FILLINGHAM WOOD, Secretary.

COMMERCIAL GAS COMPANY

NOTICE IS HEREBY GIVEN that an ORDINARY MEETING of the Proprietors of the Commercial Gas Company will be held at the Offices of the Company, Harford Street, Stepney, E. 1, on Thursday, the 25th day of February, 1943, at 2 o'clock in the afternoon.

To elect two Directors and one Auditor in the place of those retiring.

And to transact any other business.

The Minister of Fuel and Power has directed and ordered that the Accounts of the Company shall not be published, and the Accounts will not therefore be circulated to Stockholders. A copy may be inspected at the Offices of the Company by any Stockholder who gives seven days' previous notice of his desire so to do.

The STOCK TRANSFER BOOKS in respect of the Ordinary Stock will be CLOSED from the 12th day of February to the 25th day of February, both days inclusive

Offices, Stepney.

By Order of the Board, E. H. HARMAN, Secretary.

January 27, 1943.

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—Lancashire Boiler, 30 ft. by 7 ft. 6 in., 100 lb.; 75 H.P. Belliss High Speed Engine; 6 in. by 4 in. by 6 in. All Iron fitted Pump; 3 in. Electric Centrifugal Pump, 440 volt D.C.; 2,000 gallon C.I. Sectional Tank; Ten 5 in. Hopkinson Steel Valves.

HARRY H. GARDAM & Co., LTD., STAINES.

FOR SALE.—Two Lancashire Boilers, 30 ft. long by 8 ft. diameter. Working pressure 120 lb. per square inch. Made in 1927 by Messrs. D. Adamson & Co., Ltd., and tested to 180 lb. per square inch. Fitted with Wilton forced draught furnaces for Coke Breeze and complete with all fittings by Messrs. Hopkinsons.

The Torquay and Paignton Gas Company, 112, Union Street, Torquay.

FOR SALE.—Two Steam Driven ROTARY GAS COMPRESSOR SETS by Bryan Donkin, Ltd., each capable of passing 12,000 cu.ft. per hour at 3 lb. per sq.in. pressure, complete and in first-class condition. May be examined under working conditions.

Applications to be sent to J. Powdrill, General Manager, Pontypool Gas and Water Co., Pontypool, Mon.

PLANT &c. FOR SALE & WANTED (continued)

COMPRESSOR required to deliver 20,000 cu.f. of gas per hour up to 2 lb. pressure. Direct couple steam engine or electric motor drive. Speedy deliver essential.

Send full particulars to No. 9263, "GAS JOURNAL," 51, High Street, Esher, Surrey.

FOR SALE.—Morris Twelve 1939 Saloon, fitte with Walsh collapsible gas container. Good con dition. 30,000 miles. Address, No. 9264, "GA JOURNAL," 51, High Street, Esher, Surrey.

SUTTON IN ASHFIELD URBAN DISTRICT COUNCIL

TENDERS FOR DISPOSAL OF REDUNDANT PLANT AT GAS-WORKS

THE above Council invite Tenders for th purchase of the undermentioned REDUNDANT MATERIALS:

1 RAILWAY WAGON TIPPLER by E. Bennis Co., Ltd., Little Hulton; Standard Gauge, drive by 10 h.p. Electric Motor.
2 RAILWAY WAGON WEIGHBRIDGES by Ash worth, Dewsbury, to weigh up to 25 tons, all on t steel yard. No loose weights; steel platform, 14 f long.
1 10 h.p. E.C.C. MOTOR Slip Ring, 440 volts, 3 phas 50 periods, 480 revs. per minute.
1 6 h.p. Lancs. Dynamo MOTOR, 925 revs. p minute.
1 WORM REDUCTION GEAR.
1 Steam Driven GAS EXHAUSTER by Bryan Donki Ltd.—30,000 cu.ft. per hour.

The Plant can be inspected at the Council's Gas-work Fox Street, Sutton in Ashfield, at any time by appointme with the Manager.

Sealed Tenders, endorsed "Redundant Plant," must b received by the undersigned not later than 12 noon o Monday, February 8, 1943.

The Council do not bind themselves to accept th highest or any tender.

Portland Square, Sutton-in-Ashfield, Notts.
January 29, 1943.

By Order, LUTHER PEPPER, Clerk to the Council.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.
FOR NEW AND SPENT OXIDE
LONDON ROAD
Telegrams: "BRIPURIMAT"—LEICESTER — Telephon 59086.

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And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

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